

layer on a substrate for a liquid crystal device, comprising: a load lock chamber ...; a preheat chamber ...; a deposition chamber ...; and a sputter chamber ..., wherein the substrate is transferred from said deposition chamber to said sputter chamber in a vacuum, and *said load lock chamber, said preheat chamber, said deposition chamber and said sputter chamber are arranged in series*".

In this regard, Edwards teaches a cluster tool 10 in Fig. 1, which includes transport modules 12 and 14 that are interconnected by an interconnection conduit. The front transport module 12 has five module connection faces for connection to five modules. They are module aligner 16, two load-lock modules 32, 34 and batch heating modules 42, 44.

The back transport module 14 has six module connection sides for connection to six adjacent modules. They are a soft etch module 22, a sputter coating module 24, a rapid thermal processing module 26, an optional (sputter etching or sputter coating) module 28 and another optional (CVD) module 30. These modules are connected to the aligner 16.

As shown therein, the modules connected to the front transport module 12 and the back transport module 14 are arranged surrounding the robot arms 20, respectively. Thus, Edwards fails to teach or suggest the claimed feature of "*said preheat chamber, said deposition chamber and said sputter chamber are arranged in series*".

Kwansnick fails to cure this deficiency from the teachings of Edwards. Kwansnick is directed to a thin film transistor structure and is silent as to an apparatus structure for manufacturing a liquid crystal device. Since none of the cited references teaches or suggests the claimed feature of "*said preheat chamber, said deposition chamber and said sputter chamber are arranged in series*", amended claim 18 would be patentable.

Similarly, independent claim 30 recites “said load lock chamber, said preheat chamber, said first deposition chamber, said second deposition chamber, said vacuum passage and said sputter chamber are *arranged in series*”. Thus, claim 30 is patentable over Edwards and Kwansnick. Claim 31 and 33-35 that are dependent from claim 30 would be also patentable at least for the same reason.

Accordingly, Applicants respectfully request that the rejection over claims 18, 30, 31, 33 and 34 be withdrawn.

In the Office Action, claims 18 and 22-34 have been rejected under 35 U.S.C. §103(a) for being unpatentable over U. S. Patent No. 5,512,320 issued to Turner, et al. (“Turner”) in view of U. S. Patent No. 5,198,694 issued to Kwansnick, *et al.* (“Kwansnick”). This rejection is respectfully traversed.

As previously mentioned, independent claims 18 and 30 have been amended to recite that the processing chambers and a vacuum passage are arranged in series. In this regard, Turner teaches processing chambers 40, 42, 44 and 46 *surrounding* a robot for loading and unloading a substrate from one chamber to another. Thus, Turner fails to teach or suggest the claimed feature of “*said preheat chamber, said deposition chamber and said sputter chamber are arranged in series*”.

As previously mentioned, Kwansnick fails to cure this deficiency from the teachings of Edwards. Since none of the cited references teaches or suggests the claimed feature of “said preheat chamber, said deposition chamber and said sputter chamber are *arranged in series*”, amended claim 30 would be patentable. Claims 31 and 33-35 that are dependent from claim 30 would be also patentable at least for the same reason.

Accordingly, Applicants respectfully request that the rejection over claims 18, 30, 31, 33 and 34 be withdrawn.

Other Matters

In the Office Action, claim 33 has been amended to be consistent with the amendment made in claim 30, and claim 35 has been newly added to recite the features of cancelled claim 25.

CONCLUSION

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete response has been made to the outstanding Office Action and, as such, claims 18, 30, 31 and 33-35 are in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Hae-Chan Park', with a long horizontal stroke extending to the right.

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APPENDIX A

Please amend claims 18, 30 and 33, and add new claim 35, as follows. The entire pending claims, including the “clean” version of the amended claims, are provided in the APPENDIX B.

18. (Twice Amended) An apparatus for depositing a layer on a substrate for a liquid crystal device, comprising:

- a load lock chamber receiving a substrate having a gate wire pattern formed thereon;
- a preheat chamber receiving the substrate from said load lock chamber and heating the substrate before deposition;
- a deposition chamber depositing a gate insulating layer, an amorphous silicon layer and a doped amorphous silicon layer by chemical vapor deposition; and
- a sputter chamber depositing a metal layer on the doped amorphous silicon layer by sputtering,

wherein the substrate is transferred from said deposition chamber to said sputter chamber in a vacuum, and

wherein said load lock chamber, said preheat chamber, said deposition chamber and said sputter chamber are arranged in series.

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30. (Amended) [The deposition] An apparatus for manufacturing a liquid crystal display, comprising:

- a load lock chamber for receiving a substrate;
- a preheat chamber for heating the substrate;

a first deposition chamber for depositing a gate insulating layer and an amorphous silicon layer on the gate wire pattern;

a second deposition chamber for depositing a doped amorphous silicon layer on the substrate;

a sputter chamber for depositing a metal layer on the doped amorphous silicon layer; and
a vacuum passage for transferring the substrate in a vacuum from said deposition chamber to said sputter chamber to prevent oxidization of an upper surface of the doped amorphous silicon layer,

wherein said load lock chamber, said preheat chamber, said first deposition chamber, said second deposition chamber, said vacuum passage and said sputter chamber are arranged in series.

33. (Amended) The deposition apparatus of claim 30, wherein [the] said first deposition chamber and said second deposition chamber [is a] are chemical vapor deposition (CVD) [chamber] chambers.

35. (New) The deposition apparatus of claim 30, wherein the gate insulating layer is formed at a thickness between 3000 Å to 6000 Å, the amorphous silicon layer is formed at a thickness between 1000 Å to 3000 Å, and the doped amorphous silicon layer is formed at a thickness of 200 Å to 1000 Å.